

Adaptive Leading and Trailing Edge Flaps

Redesigned wing morphs to optimum shape, yet is stiff enough to resist external loads

FlexSys Inc. has developed innovative ways to change the shape of full-scale leading and trailing edge aircraft wing flaps. Employing our patented adaptive structure designs, our flaps offer continuous and seamless functionality; actuation rates that are compatible with high performance control surfaces; and the ability to twist, or change deflection, over the wing span.

Computational studies by FlexSys and Lockheed Martin show that our adaptive flaps are aeroelastically equivalent to conventional control surfaces, strong enough to withstand repeated life-cycle loading, and competitive in terms of weight, force, and power consumption.

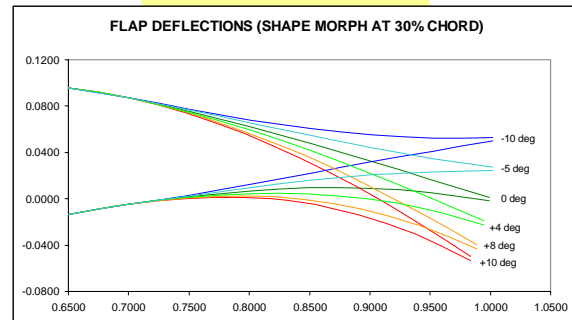
We have fabricated and tested wind tunnel models that demonstrate the aerodynamic superiority of the adaptive flap concept. Durability testing demonstrated impressive results, with orders of magnitude more endurance than the mission design specifications. Plans for transonic flight testing are underway.

For test results, video clips, and more visit our website:

www.flxsys.com

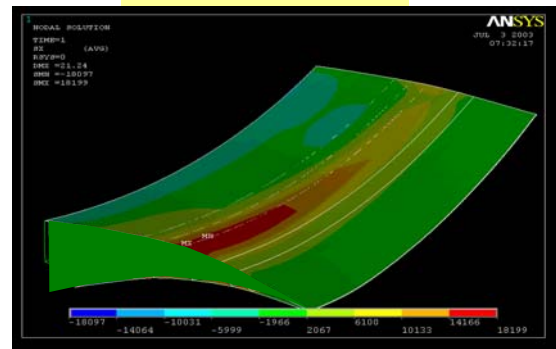
The Design Process

1. We design a shape-morphing, adaptive structure based on flight performance specifications.



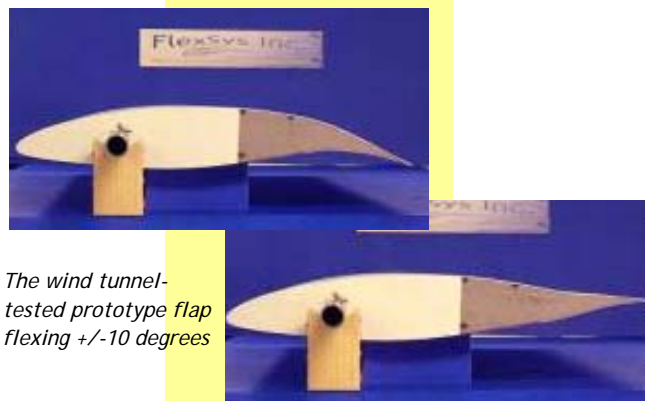
Trailing edge flap target shapes

2. We optimize the adaptive structure to match the shape requirements under external loads, minimizing actuator force, weight, and buckling and fatigue stresses.



3D non-linear simulation of trailing edge flap

3. The seamless wing with embedded adaptive structure is fabricated from aluminum and composite materials. The structure can be driven by conventional actuators.



The wind tunnel-tested prototype flap flexing +/-10 degrees